

1984 DEER PELLET GROUP SURVEY

WILDLIFE MANAGEMENT UNIT 53B

BRACEBRIDGE DISTRICT

By: Charlie Lauer
District Biologist

Greg Gillespie
Fish & Wildlife Technician



**Ministry of
Natural
Resources**

**Hon. Vincent G. Kerrio
Minister
Mary Mogford
Deputy Minister**

TABLE OF CONTENTS

	<u>Page Number</u>
Abstract	(ii)
List of Tables	(iii)
List of Figures	(iii)
Introduction	1
Method	1
Experimental Design	1
Survey Area	1
Stratification	2
The Sample Unit	2
Sample Unit Selection	2
Field Procedure	2, 3
Computations	3
Results and Discussion	4
Recommendations	4
Acknowledgements	5
References	5
Tables	6 - 11
Figures	12

(ii)

ABSTRACT

In the spring of 1984, a second deer pellet group survey was conducted in that portion of Medora and Wood Wards in the Township of Muskoka Lakes lying east of the Canadian National Railway line and north of a line between the XV and XVI concessions in Wood Ward. A stratified random sampling technique was used, with each stratum being based on the expected deer density during the winter months. The 1984 estimated deer density within the study area was 3.88 deer/km² (10.05 deer/mi²) with a total deer population of 758 in the spring of 1984.

(iii)

TABLES

Table Number		Page Number
1	Computation of Mean Survey Date and Deposition Period	6
2(a)	Computation of Stratum I Ratio and Variance	7
(b)	Computation of Stratum II Ratio and Variance	8
3	Computation of Weighted Ratio and Confidence Interval	9
4	Deer Density Estimate	10
5	Estimate of Spring 1983 and Fall 1982 Deer Populations	11

FIGURES

Figure Number		
1	Study Area (WMU 53B)	12

INTRODUCTION

The former Townships of Medora and Wood (now Wards of the Township of Muskoka Lakes) in the District of Muskoka have been closed to deer hunting for approximately 40 years.

Recently the deer population throughout the Muskoka area has increased rapidly as a result of a series of mild winters, the new harvest strategy which protects does and fawns and extensive winter browse cutting and supplementary feeding programs.

Subsequently the Medora and Wood area (now Wildlife Management Unit 53B, WMU 53B) has been subject to an ever increasing problem of deer-vehicle collisions, destruction of gardens and shrubs around homes and cottages and a severe reduction in the amount of available winter browse.

In the fall of 1982, the Township requested the Ministry of Natural Resources to suggest some way of alleviating these deer problems and as a result a 4 day controlled deer hunt has been scheduled for the fall of 1983 in WMU 53B.

A pellet group survey was therefore conducted in the spring of 1983 to establish a population estimate prior to the controlled hunt in order to better assess the effects of the hunt on the deer herd.

This report deals with a second pellet group survey conducted in the spring of 1984, in order to establish a post hunt population estimate of the Medora-Wood area. Sample units used in 1983 were again surveyed in 1984 so that results between the 2 years could be better compared.

While the pellet group survey technique does have its shortcomings, it is presently the most suitable deer population inventory technique available and if conducted according to standardized guidelines, it can provide useful trend data.

METHOD

The methodology employed in this survey follows that of the Standards and Guidelines for Deer Population Inventory and Winter Mortality Surveys in Ontario.

This technique is based on that described by D. R. King (1976) with only minor modifications.

A. Experimental Design

1. Survey Area

WMU 53B is comprised of all those lands lying to the east of the Canadian National Railway line in Medora and Wood Wards in the Township of Muskoka Lakes and north of a line between the XV and XVI concessions in Wood Ward (Figure 1).

All large waterbodies were deleted from the survey area, however, islands were included. The total land area of WMU 53B is 217.2 km² (54,301.2 acres).

The area is generally comprised of mixed hardwoods, interspersed with conifers in low lying areas.

Many of the islands have a band of cedar and hemlock around their shoreline with hardwood species in the interior portions. These islands provide excellent deer wintering areas.

2. Stratification

Often we have knowledge of a population which can be used to increase the precision or usefulness of our sample. Stratified sampling is a method that takes advantage of certain types of information about the population.

A 1980 aerial deer yard survey of WMU 53B conducted by the Ministry of Natural Resources provided the information necessary to divide this area into 2 separate strata.

Stratum I - High Density. Actual yarding areas as outlined in the 1980 aerial deer yard survey. (32.18 km² or 8046 acres)

Stratum II - Medium Density. Areas adjacent to yards which receive considerable spring and fall activity but limited winter use. (185.02 km² or 46,255.2 acres)

If more than 50% of a sample unit fell within a known deer yard as outlined in the 1980 aerial deer yard survey, the unit was considered to be in Stratum I. If more than 50% of the sample unit was outside of a known deer yarding area, it was considered to be in Stratum II.

3. The Sample Unit

The sample unit used in this survey was an equilateral triangle, 1 km on each side containing 15, 80 m² plots, spaced at 200 m intervals between plot centers. The sample units used for the 1984 survey were the same as those used in the 1983 survey.

4. Sample Unit Locations

Initially in 1983 locations were randomly selected and marked on Forest Resource Inventory Maps (F.R.I. maps). The F.R.I. maps are located in the map filing cabinet at the Bracebridge District Office (Deer Management Section - Maps #18 and 28).

B. Field Procedure

The field procedure employed in this survey followed those as outlined

in the Standards and Guidelines for Deer Population Inventory Surveys in Ontario.

Each sample unit was surveyed by a two man crew. There were no three man crews used.

C. Computations

Statistical calculations for this survey follow those suggested by Cochran (1967) and Freeze (1962) for stratified random surveys.

From the data collected, the ratio-mean number of pellet groups per 80 m² plot (R) and the variance (S_R^2) were calculated using the following formulas:

$$\text{Formula 1: } R = \frac{EY}{EX}$$

where EY = total # of pellet groups observed
EX = total # of 80m² plots searched

$$\text{Formula 2: } S_R^2 = \frac{EY^2 + R^2 EX^2 - 2REXY}{\bar{x}^2 (n-1)}$$

where EY² = The sum of Y²
EX² = The sum of X²
EXY = The sum of XY
N = The # of sample units (triangles)
 $\bar{x}^2 = \frac{EX}{N}$

The mean pellet group density estimate (R) was converted to a deer density estimate using the following formula:

$$\text{deer/km}^2 = \frac{Rst (12500)}{(\text{Deposition period}) (\text{mean defecation rate})}$$

The deposition period was calculated from the date of 90% leaf-fall to the mean survey date (Table 1).

The mean defecation rate used was 13.8.

Because some deer died during the deposition period, corrections were made to convert this population estimate to spring and fall population estimates.

RESULTS AND DISCUSSION

The uncorrected deer density estimate and total deer population for 1984 were 3.88 deer/km² (10.05 deer/mi²) and 843 deer respectively (Tables 4 and 5).

The population in the spring of 1984 was estimated to be 758 deer, while in the fall of 1983, prior to the controlled hunt, it was 947 deer (Table 5). Results of the 1984 and 1983 surveys are summarized below:

Deer Pellet Group Survey

WMU 53B - BRACEBRIDGE DISTRICT

	<u>1982</u>	<u>1983</u>	<u>1984</u>
Deposition Period (days)		207	187
Uncorrected Deer Density for Deposition Period (Deer/km ²)		5.73	3.88
Total Uncorrected Deer Population		1245	843
Spring Deer Population		1184	758
Fall Deer Population	1284	947	---

Comparisons between the mean estimates of the two pellet group surveys show a reduction in the size of the herd by 426 deer between the spring of 1983 and the spring of 1984. The legal harvest during the 1983 controlled hunt removed 64 of these deer, or 15%. Other factors such as illegal harvest and winter mortality may account for a portion of the remainder.

However, the general feeling of Bracebridge Fish and Wildlife staff is that the Medora-Wood deer herd has grown in number from 1983 to 1984. Increased deer-vehicle collisions, sightings and shrub damage complaints from area residents over the same period support this feeling. It is therefore believed that the inaccuracy of the pellet group survey and the subsequent wide confidence limits are largely responsible for the reduction in deer numbers between the 1983 and 1984 surveys.

The deer density in WMU 53B is still very high and is approaching a level where overbrowsing and/or disease will become a real threat to the herd. The legal harvest during the 1983 controlled hunt was relatively small and probably did not halt or cause a reduction in the expansion of the deer population.

RECOMMENDATIONS

1. An open season for deer be declared in WMU 53B for the fall of 1984, with a large increase in the number of permits issued over the 1983 hunt.

2. Continue to collect biological data where possible from animals harvested in the controlled hunt in order to help monitor the condition of the Medora-Wood deer herd, as well as to determine if, over time, the hunt causes any noticeable changes in the herd dynamics.
3. Discontinue pellet group surveys due to the large variance of estimates obtained for the time and money expended on data collection.
4. Continue to create browse plots and supply volunteers with supplementary feed as needed, in order to prevent widespread starvation in the deer herd and reduce damage to ornamental trees and shrubs by providing an alternative food supply.

REFERENCES

- Cochran, W.C. 1953. Sampling Techniques. John Wiley and Sons, Incorporated, New York. XVII + 413 pp.
- Freeze, F. 1962. Elementary forest sampling. U.S. Dept. of Agric., Forest Service, Agriculture Handbook Number 232 IV + 91 pp.
- King, Dennis R. 1976. Estimates of the white-tailed deer population and mortality in central Ontario, 1970-72. Canadian Field - Naturalist 90(1): 29-36.
- Ministry of Natural Resources 1980. Aerial Deer Yard Survey, Bracebridge District, unpublished report.

Table 1
1984 Deer Pellet Group Survey
WMU 53B - Bracebridge District

Computation of Mean Survey Date and Deposition Period

<u>Date (A)</u>	<u>No. of sample units completed (n)</u>	<u>(A x n)</u>
May 1	4	4
May 2	3	6
May 10	1	10
May 15	1	15
Total	9	35

$$\text{Mean Survey Date} = \frac{E(A \times n)}{En} = \frac{35}{9} = 3.89$$

Mean Survey Date = May 4, 1984

Deposition Period = Date of 90% Leaf Fall to Mean Survey Date

= October 30, 1983 - May 4, 1984

= 187 days

Table 2(a)
1984 Deer Pellet Group Survey
WMU 53B Bracebridge District

Computation of Stratum I Ratio and Variance

Area Name	WMU 53B	Compiler	Gillespie		
Stratum	I	Year	1984		
Sample Unit #	# of Plots Counted (x)	# of Pellet Groups Found (y)	X ²	Y ²	XY
1	14	15	196	225	210
2	15	14	225	196	210
3	11	40	121	1600	440
4	13	32	169	1024	416
Total	53	101	711	3045	1276

$$R = \frac{EY}{EX} = \frac{101}{53} = 1.91$$

$$R^2 = 3.65$$

$$S^2 R = \frac{EY^2 + R^2 \times EX^2 - 2REXY}{\bar{X}^2 (n - 1)}$$

$$= \frac{3,045 + 3.65 \times 711 - 2 \times 1.91 \times 1,276}{177.75 (4 - 1)}$$

$$= \frac{3,045 + 2,595.15 - 4,874.32}{533.25}$$

$$= \frac{5,640.15 - 4,874.32}{533.25}$$

$$= \frac{765.83}{533.25}$$

$$= 1.44$$

Table 2(b)
1984 Deer Pellet Group Survey
WMU 53B Bracebridge District

Computation of Stratum II Ratio and Variance

Area Name	<u>WMU 53B</u>	Compiler	Gillespie		
Stratum	<u>II</u>	Year	1984		
Sample Unit #	# of Plots Counted (x)	# of Pellet Groups Found (y)	X ²	Y ²	XY
5	15	1	225	1	15
6	13	4	169	16	52
7	15	26	225	676	390
8	14	11	196	121	154
9	15	1	225	1	15
Total	72	43	1040	815	626

$$R = \frac{EY}{EX} = \frac{43}{72} = 0.60$$

$$R^2 = .36$$

$$S^2 R = \frac{EY^2 + R^2 \times EX^2 - 2REXY}{\bar{X}^2 (n - 1)}$$

$$= \frac{815 + .36 \times 1,040 - 2 \times .60 \times 626}{208 (5 - 1)}$$

$$= \frac{1,189.40 - 751.20}{832.00}$$

$$= \frac{438.20}{832.00}$$

$$= .53$$

Table 3
1984 Deer Pellet Group Survey
WMU 53B Bracebridge District

Computation of Weighted Ratio and Confidence Interval

Stratum	Area (km ²)	Wi	Ri	WiRi	Ni	Wi ²	S ² Ri	$\frac{Wi^2 S^2 Ri}{Ni}$
I	32.18	.15	1.91	.29	4	.02	1.44	.01
II	185.02	.85	0.60	.51	5	.72	.53	.08
Total	217.20	1.00		.80	9			.09

$$R_{st} = EWiRi = .80 \text{ pellet groups/80 m}^2 \text{ plot}$$

$$S.E.(R) = \frac{Wi^2 S^2 Ri}{Ni} = .09 = .30$$

$$2 \text{ S.E. (R)} = .60$$

$$2 \text{ S.E. (R) as a \% of } R_{st} = \pm 75.00\% = 95\% \text{ confidence limits}$$

$$R_{st} = .80 \pm 75.00\% \text{ or } \pm .60$$

$$\therefore 95\% \text{ Confidence limits for } R_{st} = .20 - 1.40$$

- Wi = proportion of the sample area in stratum I
 Ri = ratio of pellet groups per 80 m² plot in stratum
 Ni = no. of sample units in the stratum
 S²Ri = the variance for the stratum
 R_{st} = weighted ratio for the entire area
 S.E. (R) = the standard error of the ratio (R_{st})

Table 4
1984 Deer Pellet Group Survey
WMU 53B Bracebridge District

Deer Density Estimate

$$\begin{aligned}\text{deer/km}^2 &= \frac{R_{st} (12,500)}{(\text{Deposition Period}) (\text{mean defecation Rate})} \\ &= \frac{.80 \times 12,500}{187 \times 13.8} \\ &= \frac{10,000}{2,580.60} \\ &= 3.88\end{aligned}$$

number of deer/km² = 3.88 (uncorrected density of deer for the deposition period)

Table 5
1984 Deer Pellet Group Survey
WMU 53B Bracebridge District

Estimate of Spring 1984 and Fall 1983 Deer Populations

$$\begin{aligned}\text{Total Deer Populations (uncorrected)} &= \text{no. of deer/km}^2 \times \text{total \# of km}^2 \\ &= 3.88 \times 217.20 \\ &= 842.74 \pm 75.00\% \\ &= 843 \text{ deer} \pm 632\end{aligned}$$

$\therefore$ 95% Confidence limits for Total Deer Population = 211 - 1,475

Legal kill of 64* deer contributing 9 days each.

$$\frac{9 \text{ days} \times 64 \text{ deer}}{187 \text{ (deposition period)}} = 3.08 \text{ (3 deer)}$$

Estimated winter mortality, road kills and illegal kills of deer contributing 123** days.

$$\frac{123 \text{ days} \times 125 \text{ deer}}{187 \text{ (deposition period)}} = 82.22 \text{ (82 deer)}$$

$$\begin{aligned}\text{Spring 1984 population} &= 843 - 82 - 3 \\ &= 758 \text{ deer}\end{aligned}$$

$$\text{Legal Harvest} = 64$$

$$\text{Non-Hunting Mortality} = 125$$

$$\text{Fall 1983 Population} = 758 + 64 + 125 = 947.00 \text{ deer}$$

* Estimated Mean Date of Legal Kill - November 8, 1983

** Estimated Mean Date of Winter Losses - March 1, 1984

